



RDECOM

US ARMY POWER OVERVIEW

CERDEC
US ARMY – RDECOM

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Presented by:

LTC John Dailey

International Technology Center Pacific - SE Asia
Singapore

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Speed, Reach, and Precision

Current Force



~100 lb. load



70+ tons



From Platforms to
System of Systems

Enabling the Future Force



C-130-Like
Transportability

Enhancing the Current Force

Future Force

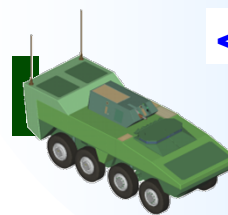
< 40 lb.
load



Fully networked



< 20 tons





Metal Air Batteries



Primary and Rechargeable Batteries



Tactical
Generators



Environmental Control Units



- Soldier Power Sources
- Power Generation
- Environmental Control Systems
- Power Management



Hybrid Power Sources



Fuel Cells



Smart Batteries



Stirling Engine Power



Smart Chargers



Portable Solar Power & Power Adapters

➤ BATTERY & CHARGER TECHNOLOGIES

- ✱ Non-Rechargeable Batteries: LiCF_x , LiMnO_2 , Zn-Air, Li-Air
- ✱ Rechargeable Batteries: NiMH, Li-ion, NiZn
- ✱ Chargers: Smart Chargers - SMBUS

➤ HYBRID POWER SOURCES

- ✱ Batteries & Fuel Cells (DMFC, RMFC, SOFC), Batteries & Stirling (LFP, Kinematic)
- ✱ Packaged & Reformed Fuels: Methanol, Propane, NaBH_4 , Ammonia Borane
- ✱ Direct JP-8 Fuel Goal – SOFC, Stirling Burner

➤ RENEWABLES/ALTERNATIVE ENERGY

- ✱ Solar, Wind Energy Storage Systems
- ✱ Bio-Fuels, Hydrogen Generation

➤ MOBILE ENVIRONMENTAL CONTROL UNITS

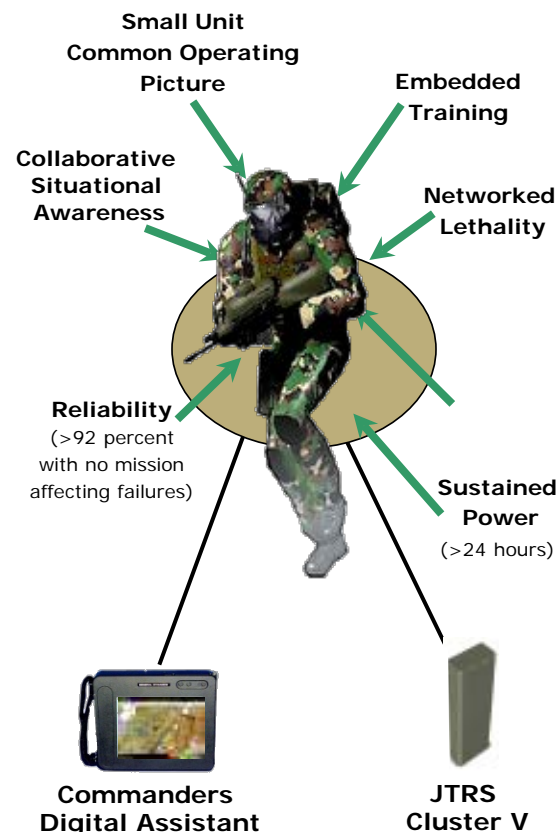
- ✱ Advanced CO_2 Cooling
- ✱ Co-Gen Systems (HAC & Stirling / Fuel Cell)

Existing Situation:

- Batteries are too large, heavy, and costly
- Too many battery types
- Too many batteries required to complete long missions
- Future power demands are increasing



Ground Soldier System In Support of FCS Spirals



Existing Situation:

- Generators are too large and heavy
- Generators use too much fuel
- Generators are noisy
- No integrated power management



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Near Term Mid Term Far Term

Battery Chemistries

Advanced Lithium -
Lighter, Smaller, Longer
Run Time, Reduced
Logistic Cost

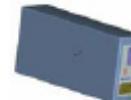
Primary -	300 Wh/kg	500 Wh/kg	1000 Wh/kg
Rechargeable -	200 Wh/kg	250 Wh/kg	300 Wh/kg



Zn-Air
Li-MnO₂
Li-Ion



Li-CFx
Adv Li-Ion



Li-rechargeable
Li-Air

Fuel Cells

Log and Alternative
Fueled - ManTech
Needed To Bring
Affordability

MeOH Fueled



JP-8 Fueled



Hydrogen



Alternative Energy Systems- Solar

ManTech Needed To
Bring Affordability For
Advanced Solar

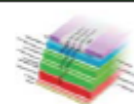
Efficiency % - 10
Thin Film



20
Crystalline Si



30+
Multi-junction GaAs



Advanced Engine Technology and Smart Power Electronic Controls

Smart Power Grids,
CoGen, & Hybrids For
Fuel & Weight Savings

Weight Savings %-

JP-8 Fueled
25

Alternative Fuels/Co-Gen Hybrids
50



Fuel Use Savings % -

30

50



SUMMARY

➤ **Recent technology advancements and systems approach are enabling advanced power systems:**

- Micro-Nano areas
- Materials
- Modeling
- Accelerating chemical processes
- Component miniaturization



SUMMARY(cont.)

- Batteries continue to improve - lasting longer, lighter, and smaller.
- Silent Fuel Cell and Stirling Power systems emerging for extending missions.
- Alternative Energy Technologies (such as Solar), Intelligent Power Management, and Co-Generation gaining focus with the hope of improved fuel efficiency and reduced logistics.